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Yuichi Kobayashi, Organic Chem Curr Res 2017, 6:1(Suppl)
http://dx.doi.org/10.4172/2161-0401.C1.016

2nd European Organic Chemistry Congress

March 02-03, 2017 Amsterdam, Netherlands

Allylic substitutions of secondary allylic esters: Allylic picolinates with organocopper reagents and allylic phosphates with Ar_2CH anions

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We have developed several substitution reactions at a secondary carbon for synthesis of natural products possessing chiral C–C bond(s). Among the reactions, we present herein allylic substitution of the following two types (equation 1 and 2). The former (eq. 1) features the picolinoxy leaving group, which is activated by chelation to $MgBr_2$ generated *in situ*. This leaving group allows the use of aryl, hetero-aryl, alkenyl, and alkynyl reagents, which are generally less reactive than well-studied alkyl species. The substitution with these reagents proceeds with high anti S_N2' selectivity. Furthermore, this substitution works well on ß,ß-substituted allylic picolinates, furnishing quaternary carbons. This reaction has been utilized as a key step for synthesis of several biologically active compounds such as the active form of loxoprofen, cyclobakuchiol A, mesembrine, anastrephin, axenol, etc., (Figure 1). The second substitution to be presented herein is the allylic substitution of secondary allylic phosphates with Ar_2CH anions (equation 2), which proceeds with high efficiency to afford S_N2 products regio- and stereoselectively.

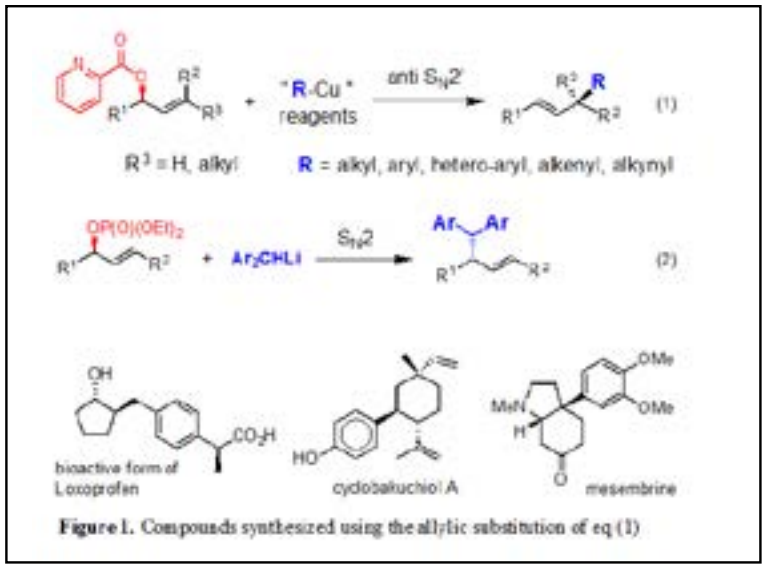

Figure 1. Compounds synthesized using the allylic substitution of eq (1)

Biography

Yuichi Kobayashi has obtained his PhD from Tokyo Institute of Technology in 1981 under the supervision by Professor J Tsuji; a Post-doctoral degree under Professor G Stork at Columbia University, New York (1981-1982). He was an Assistant Professor at the Fumie Sato Laboratory at the Tokyo Institute of Technology (1982-1988). Currently, he is a Full Professor at Tokyo Institute of Technology. His research fields are organic synthesis, synthetic methodology using transition metal catalysts, synthesis of natural products, which include fatty acid metabolites such as resolvins, cinchona alkaloids, isoprostane (a new type of cyclopentanoids), phoslactomycins, etc.

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